

67. The kit of Claim 66, wherein the T7-type RNA polymerase is selected from the group consisting of T3, ϕ I, ϕ IIH, W31, gh1, Y and A1122.

68. The kit of Claim 66, wherein said nucleoside triphosphates are chosen from the group consisting of ATP, CTP, GTP, and UTP or rTTP and said ddNTPs are ddATP, ddCTP, ddGTP, and ddUTP or ddTTP.

69. The kit of Claim 66, wherein said nucleoside triphosphates are chosen from the group consisting of dATP, dCTP, dGTP, dUTP, dTTP, 7-deaza-dGTP, dITP, 5-methyl-dCTP, and 5-hydroxy-methyl-dCTP and said ddNTPs are ddATP, ddCTP, ddGTP, and ddUTP or ddTTP.

70. The kit of Claim 66, wherein said nucleoside triphosphates are chosen from the group consisting of 2'-F-ATP, 2'-F-CTP, 2'-F-GTP, 2'-F-UTP, 2'-F-TTP, 2'-deaza-2'-F-GTP, 2'-F-ITP, 5-methyl-2'-F-CTP, and 5-hydroxymethyl-2'-F-CTP and said ddNTPs are ddATP, ddCTP, ddGTP, and ddUTP or ddTTP.

71. A kit for determining a sequence of a nucleic acid molecule by a dideoxy sequencing procedure, which kit comprises:

- a) a mutant T7-type RNA polymerase, wherein said mutant T7-type RNA polymerase has a reduced discrimination between canonical and non-canonical nucleoside triphosphates;
- b) a primer for extending, in a template-dependent manner, a nucleic acid comprising a sequence complementary to said nucleic acid molecule;
- c) four nucleoside triphosphates; and
- d) four ddNTPs.

72. The kit of Claim 71, wherein the T7-type RNA polymerase is selected from the group consisting of T3, ϕ I, ϕ IIH, W31, gh1, Y and A1122.

73. The kit of Claim 71, wherein said nucleoside triphosphates are chosen from the group consisting of ATP, CTP, GTP, and UTP or rTTP and said ddNTPs are ddATP, ddCTP, ddGTP, and ddUTP or ddTTP.

74. The kit of Claim 71, wherein said nucleoside triphosphates are chosen from the group consisting of dATP, dCTP, dGTP, dUTP, dTTP, 7-deaza-dGTP, dITP, 5-methyl-dCTP, and 5-hydroxy-methyl-dCTP and said ddNTPs are ddATP, ddCTP, ddGTP, and ddUTP or ddTTP.

75. The kit of Claim 71, wherein said nucleoside triphosphates are chosen from the group consisting of 2'-F-ATP, 2'-F-CTP, 2'-F-GTP, 2'-F-UTP, 2'-F-TTP, 2'-deaza-2'-F-GTP, 2'-F-ITP, 5-methyl-2'-F-CTP, and 5-hydroxymethyl-2'-F-CTP and said ddNTPs are ddATP, ddCTP, ddGTP, and ddUTP or ddTTP.

76. A method for synthesizing a nucleic acid molecule comprising at least one non-canonical nucleotide, comprising the steps of:

- a) incubating a template nucleic acid in a reaction mixture under nucleic acid synthesis conditions containing (i) a mutant T7-type RNA polymerase, wherein said T7-type RNA polymerase has a reduced discrimination between canonical and non-canonical nucleoside triphosphates, and (ii) at least one non-canonical nucleoside triphosphate, wherein said non-canonical nucleoside triphosphate is incorporated into the synthesized nucleic acid in place of only one canonical nucleoside triphosphate; and
- b) obtaining the synthesis of a nucleic acid molecule comprising at least one non-canonical nucleotide.

77. The method of Claim 76, wherein the T7-type RNA polymerase is selected from the group consisting of T3, ϕ I, ϕ IIH, W31, gh1, Y and A1122.

78. The method of Claim 76 wherein the template nucleic acid is DNA.

79. The method of Claim 76 wherein the template nucleic acid is RNA.

80. The method of Claim 76 wherein a nucleic acid molecule comprising at least one non-canonical nucleotide is synthesized by extension of a primer molecule, at least part of which is sufficiently complementary to a portion of the template to hybridize therewith.

81. The method of Claim 76 wherein a nucleic acid molecule comprising at least one non-canonical nucleotide is synthesized *de novo* without using a primer molecule.

82. The method of Claim 76 wherein the non-canonical nucleoside triphosphate is a 2'-fluoro-nucleoside triphosphate.

83. The method of Claim 76 wherein the synthesized nucleic acid molecule has an altered susceptibility to a ribonuclease or a deoxyribonuclease compared to a nucleic acid which is synthesized using the corresponding non-mutant RNA polymerase.

84. The method of Claim 76 wherein the synthesized nucleic acid molecule is selected from the group consisting of a ribozyme or a nucleic acid molecule used for gene therapy, in a vaccine, in an antiviral composition, in an antimicrobial composition, in an antisense composition for regulating gene expression, in a composition for hybridization to a complementary nucleic acid, or as a probe for detection of a complementary nucleic acid.

85. The method of Claim 76 wherein the synthesized nucleic acid molecule is single-stranded.

86. A kit for performing the method of Claim 76, comprising a mutant T7-type RNA polymerase which has reduced discrimination between canonical and non-canonical nucleoside triphosphates and data or information describing conditions under which the method of Claim 76 may be performed.

87. The kit of Claim 86, wherein the T7-type RNA polymerase is selected from the group consisting of T3, ϕ I, ϕ IIH, W31, gh1, Y and A1122.